

Platelet-Rich Plasma and an Alloplastic Bone Graft as a Clinically Effective Regenerative Modality for a Primary Periodontic Lesion with Secondary Endodontic Involvement: A Case Report

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ABSTRACT

Pulpo-periodontal lesions are lesions resulting from an inflammatory sequence which can take origin from pulp or periodontium. If the pulp is the primary origin of diseases, endodontic therapy successfully controls the symptoms and causes the resolution of diseases, if however, the periodontium is involved or if a failure occurs at primary endodontic treatment a surgical intervention may be required. A 42-year male patient with a pulp-periodontal lesion in the right first molar was treated with root canal treatment followed by a surgical procedure in which platelet-rich-plasma (PRF) with bone substitute was used as a replacement for lost bone support. Bone growth was radiographically and a reduction in probing depth was seen at 6 months after 12 months follow-up probing dept was maintained. This case report was aimed to access the healing of bony defect when treated with a combination of alloplastic bone graft and PRF. The regenerative capacity of a combination of PRF and bone substitute can be considered a useful treatment modality for new bone growth and regaining of lost bone support.

Keywords: PRF, alloplastic graft, endo-period lesion, pulp-periodontal lesion.

INTRODUCTION

The pulpal and periodontal health of a tooth is interrelated, which maintains the proper functioning of masticatory apparatus.^[1] The pulpal diseases can be easily diagnosed and treated but in certain situations, it becomes complex to treat the involved tooth on the whole when it's combined with complex periodontal disease. It is imperative to treat the pulp-periodontal disease in a holistic approach when such a situation is encountered. To help prevent recurrence and maintain the function,^[2] surgical procedures like an open flap, root-end resection and retrograde filling have been followed conventionally to treat endo-perio lesions, more recently procedures like guided tissue regeneration (GTR), bone replacement via grafts and growth factor rich plasma fibrin (PRF) have been introduced to fill in the bony defect and promote healing and regeneration, which otherwise may heal by scar tissue.^[3] This case report seeks to

access the healing of bony defect when treated with a combination of alloplastic bone graft and PRF.

CASE REPORT

A 42-year-old male patient reported to the department of conservative and endodontics with the chief complaint of pain in the right upper back tooth region of the jaw since 2 months with a history of pus discharge, the pain was reported to be intermittent. On clinical examination, no caries or other anomaly was detected while examining hard structures of the tooth. Gingival swelling was seen buccally around the distal aspect of 16 [Figure 1]. Electric pulp testing was done to check the vitality of the tooth, which gave no response. On vertical percussion, 16 was found to be tender. The patient was referred for an intraoral periapical radiograph (IOPA) which revealed radiolucency on the distal aspect of 16, encompassing the entire surface [Figure 2]. Probing along the distal aspect showed a vertical probing depth of 8 mm. Endodontic treatment was initiated first and then periodontal treatment was scheduled at a later date. The tooth was anesthetized using 2% lidocaine with 1:100000 epinephrine (Warren, Lignox, India) using posterior superior alveolar and greater palatine block. A rubber dam was applied and the access cavity was prepared using endo access bur

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(Dentsply, India). Refinement of the access cavity was done using Endo Z bur (DENTSPLY, India). Canals were patent and glide path was established using #8, #10 K -files. Working length was determined using an apex locator (Root ZX, Morita, Tokyo, Japan) and confirmed using an intraoral periapical radiograph at 0.5 mm from the apical foramen.

Root canal instrumentation was done using the ProTaper gold NiTi system (Dentsply, Maillefer, Ballaigues, Switzerland) in the crown down manner. Slow speed engine-driven motor (X Smart, Dentsply, Maillefer, Ballaigues, Switzerland) was used in continuous rotation at torque and speed recommended by the manufacturer. While preparing canals the instruments were checked for any defect and cleaning with gauge was performed with each insertion of the instrument into the canal to prevent clogging of debris.

Instruments were aided with continuous irrigation of 2.5% sodium hypochlorite and final irrigation of 17% EDTA was done before obturation. AH, plus sealer (Dentsply, Maillefer, Ballaigues, Switzerland) along with Gutta-percha cones were used to seal the root canal space. After obturation provisional restoration was done using glass ionomer cement and a postoperative radiograph was taken.



Figure 1: Preoperative radiograph with probing depth



Figure 2: Preoperative radiograph showing radiolucency along distal aspect of 16



Figure 3: PRF prepared from whole blood



Figure 4: reflection of flap after intracrevicular incision



Figure 5: Placement of bone graft and PRF

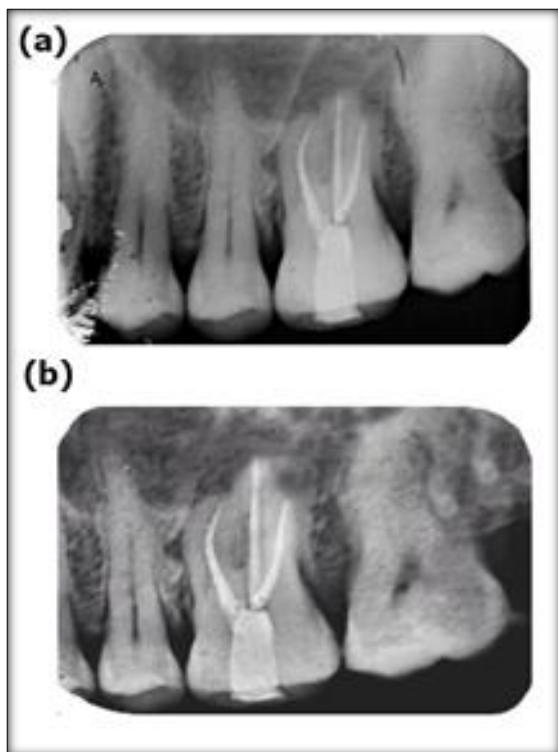


Figure 6: Follow up radiograph (a) at months (b) at 12 months

After a week, periodontal treatment was initiated and the area anesthetized. A full-thickness mucoperiosteal flap was raised, the approach was made both buccally [Figure 4]. An intracrevicular incision was made and bone curette was used to remove unhealthy tissue. Meanwhile, PRF was prepared using 10 ml of blood drawn by venipuncture of the antecubital vein and placed in two test tubes of 5 ml each. Anticoagulant and acid-citrate-dextrose was mixed with whole blood and centrifuged at 3000 cycles/ minute for 10 sec, a second centrifugation cycle was followed at 2000 cycles/minute for 10 minutes. After drawing out of plasma using a micropipette from the test tube [Figure 3], a PRF was obtained after combining it with 0.1g of calcium chloride.

Alloplastic bone graft and PRF was mixed and placed in a bony crypt [Figure 6] and the flap was reflected and closed using interrupted suturing using silk suture (3-0). Sutures were removed after 7 days and the patient was recalled at intervals 3, 6, 9, 12 months. Probing showed a great reduction in depth and was measured at 2 mm at 12 months follow up [Figure 6].

DISCUSSION

Pulpo-periodontal lesions are a common condition that can be easily diagnosed after taking a thorough history and clinical examination. But certain cases present difficulty in treatment planning, which if approached properly will lead to complete resolution of symptoms and favorable healing

outcomes. Proper diagnosis depends on the evaluation of findings obtained via percussion, palpation, pulp vitality, radiographs and probing.^[4] In this case study, the patient presented with a history of intermittent pain and on pulp vitality testing a negative response was obtained, confirming complete necrosis of the pulp. A bony pocket which measured at 8 mm along the distal aspect of the tooth. Also, involvement of the root apices was observed on the radiograph. Since no caries or pulpal involvement was seen on the radiograph, the patient was diagnosed as primary periodontal with secondary endodontic pulpo-periodontal pathology, according to classification by Simon et al.

The success of pulpo-periodontal pathology has been reported in the literature to be around 32% when surgical intervention is not performed conventionally.^[5] Regenerative procedure acts as succor for healing by regulation of growth factors and helps regeneration of lost periodontal support. Choukroun et al,^[6] introduced platelet-rich fibrin to get over the shortcomings of plasma rich platelets used for regenerative procedures. PRF represents a new developmental step in the platelet gel therapy with easy processing and without any artificial biochemical changes.

The use of PRF is increasingly used in periodontal therapy and has shown to have angiogenic and tissue proliferative properties. Tissue growth factor β and platelet-derived growth factor (TGF- β and PDGF) that are present in PRF in high concentrations promotes differentiation of osteoblasts and thus proves to have a positive impact on healing. Different graft materials including the use of guided tissue regeneration (GTR) have been used in the successful treatment of periodontal bony defects, GTR can be used as an adjunctive treatment along with PRF.^[7]

Platelet-rich fibrin contains high fibrin content and it acts as hemostatic and in the stabilization of blood clot and promotes wound healing. Several studies were conducted in which a significantly favorable outcome was seen when PRF was combined with alloplastic bone graft containing tricalcium phosphate.^[8,9]

Bone grafts promote osteoconductivity, matrix supports the ingrowth of new bone and with osteoconductive proteins, it leads to the mitogenesis of undifferentiated cells. Bioactive glasses are alloplastic materials that act by osteoconduction and osteopromotion.^[10] Alloplastic bone graft consists of bioactive glass which acts by the ionic dissolution of ceramic forming the hydroxycarbonate apatite layer, hence enhances bone formation. The apatite layer has been shown to provide a surface for osteoblast cell attachment and bone mineral deposition. A silica gel layer is formed initially and over that calcium phosphate is

formed which gets converted to hydroxyapatite thus acting as osteoconductive material.^[4]

This case report has a follow-up of 12 months and histological evaluation of bone needs to be evaluated which can be considered a shortcoming of this report. PRF along with bone grafts offers several advantages including the promotion of wound healing, bone growth and maturation, graft stability, hemostasis and improves handling properties of graft materials.

CONCLUSION

Pulpo-periodontal pathology is a common condition of the oral cavity which can be treated successfully by proper evaluation of the patient. Healing of endodontic treatment has shown predictable outcomes but research in the field of regeneration of periodontal healing is to be substantiated and fully understood. This case report evaluates the management and clinical outcome of endo-period lesion when treated with a combination of alloplastic graft material and PRF.

REFERENCES

1. Simring M, Goldberg MJTJoP. The pulpal pocket approach: retrograde periodontitis. 1964;35(1):22-48.
2. Aichelmann-Reidy ME, Yukna RJDCoNA. Bone replacement grafts. The bone substitutes. 1998;42(3):491-503.
3. Nair PR, Sjögren U, Figdor D, Sundqvist GJOS, Oral Medicine, Oral Pathology, Oral Radiology, Endodontontology. Persistent periapical radiolucencies of root-filled human teeth, failed endodontic treatments, and periapical scars. 1999;87(5):617-27.
4. Goyal LJRd, endodontics. Clinical effectiveness of combining platelet rich fibrin with alloplastic bone substitute for the management of combined endodontic periodontal lesion. 2014;39(1):51-5.
5. Hirsch J-M, Ahlström U, Henrikson P-Å, Heyden G, Peterson L-EJJoOS. Periapical surgery. 1979;8(3):173-85.
6. Choukroun J, Diss A, Simonpieri A, Girard M-O, Schoeffler C, Dohan SL, et al. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part V: histologic evaluations of PRF effects on bone allograft maturation in sinus lift. 2006;101(3):299-303.
7. Lei L, Yu Y, Han J, Shi D, Sun W, Zhang D, et al. Quantification of growth factors in advanced platelet-rich fibrin and concentrated growth factors and their clinical efficacy as adjunctive to the GTR procedure in periodontal intrabony defects. 2020;91(4):462-72.
8. Kim B-J, Kwon T-K, Baek H-S, Hwang D-S, Kim C-H, Chung I-K, et al. A comparative study of the effectiveness of sinus bone grafting with recombinant human bone morphogenetic protein 2-coated tricalcium phosphate and platelet-rich fibrin-mixed tricalcium phosphate in rabbits. 2012;113(5):583-92.
9. Attia AMJDJ. Evaluation of beta-tricalcium phosphate and platelets rich plasma in management of intrabony defects: clinical and radiographic study. 2010; 56:1.
10. Kolk A, Handschel J, Drescher W, Rothamel D, Kloss F, Blessmann M, et al. Current trends and future perspectives of bone substitute materials—from space holders to innovative biomaterials. 2012;40(8):706-18.

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